

5

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 06-346029

(43)Date of publication of application : 20.12.1994

(51)Int.Cl.

C09J 7/02  
C09J 7/02  
C09J 7/02  
C09J 7/02  
A01N 25/10  
A01N 25/34  
A01N 43/40

(21)Application number : 05-140570

(71)Applicant : NITTO DENKO CORP

(22)Date of filing : 11.06.1993

(72)Inventor : KAZUSE NORITAKA  
YAMAMOTO TOSHIYUKI

## (54) ANTIMICROBIAL TACKY SHEET

(57)Abstract:

PURPOSE: To obtain the subject sheet excellent in transferring property of antimicrobial agent to adhered, untransferring property of a tacky layer and antistatic property and useful for removing dust in sickrooms, etc., by forming a hydrophilic polymer gel layer containing a hydrophilic substance, water and an antimicrobial substance on a support.

CONSTITUTION: This tacky sheet is obtained preferably by forming a gel layer containing (A) a hydrophilic polymer substance, (B) a hydrophilic low-molecular substance such as a polyhydric alcohol, a sugar alcohol or lithium nitrate, (C) water and (D) an antimicrobial substance such as a water-soluble disinfectant or an antimicrobial agent on a support, which preferably has water repellency, where the adhesiveness of the gel layer is 50-500g/20mm. Furthermore, in this sheet, the component A is preferably composed of a polyacrylic acid (salt) and a compound having  $\geq 2$  epoxy groups in the molecule.

Disclaimer:

This English translation is produced by machine translation and may contain errors. The JPO, the NCIP, and those who drafted this document in the original language are not responsible for the result of the translation.

Notes:

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

Translated: 23:12:20 JST 12/06/2004

Dictionary: Last updated 10/12/2004 / Priority:

---

## CLAIMS

---

### [Claim(s)]

[Claim 1] The anti-microorganism nature pressure sensitive adhesive sheet which the gel layer which contains the hydrophilic low-molecular matter, water, and the anti-microorganism nature matter in a hydrophilic polymeric material forms on a base material, and is characterized by the adhesive strength of said gel layer being 50-500g / 20mm.

[Claim 2] The anti-microorganism nature pressure sensitive adhesive sheet according to claim 1 characterized by said base material having water repellence.

[Claim 3] The anti-microorganism nature pressure sensitive adhesive sheet according to claim 1 with which a hydrophilic polymeric material consists of a compound which has at least two epoxy groups in polyacrylic acid and/or polyacrylate, and a molecule.

---

## DETAILED DESCRIPTION

---

### [Detailed Description of the Invention]

#### [0001]

[Industrial Application] This invention relates to the anti-microorganism nature pressure sensitive adhesive sheet which consists of a base material and an anti-microorganism nature adhesive layer. It is related with the still more detailed adhesiveness sheet which the antistatic effectiveness and the validity of this invention of an antimicrobial agent are large since moisture moderate for a binder component is contained, and can imprint an antimicrobial agent to adherend, or a film (only henceforth an adhesive sheet).

#### [0002]

[Description of the Prior Art] In order to prevent the drag-in of the dust to the interior of a room, such as an operating room of a hospital, and a sickroom, generally carrying out adhesion capture of the dust which has arranged the laminating mat for dust removing at these inlet ports, and has adhered to them at the flesh side of footwear or the axle-pin rake of a stretcher is performed. Moreover, generally removing dust as cleaning tools, such as a roller, is performed. Furthermore, an antimicrobial agent is blended with these binder layers, and, generally giving disinfection to a sheet and a roller is also performed. (JP, 55-

49254,A, JP,S55-95674,U, JP,S56-164087,U) Generally the following properties are required of such a laminating mat and a roller.

(1) There is no transfer of the adhesives to the covering side processed with that it has moderate adhesive strength and dust can be removed certainly, (2) footwear bottoms and an axle-pin rake, or the roller, (3) Thing [0003] which does not have static electricity generating at the time of exfoliation when [ which carried out the thing (4) laminating ] annihilating bacteria, true fungi, etc. which were captured to the adhesive face in what blended the antimicrobial agent with the binder

[Problem to be solved by the invention] In order to fulfill the demand characteristics (2) of conventional technology, it is required that the binder itself should not carry out transfer to a covering side, but on the other hand, if some [ which were blended with the binder / other ] components are made to shift to adherend and it is made to demonstrate the efficacy in respect of covering, the utilization range of a pressure sensitive adhesive sheet is expanded, and will be able to become useful. The actual condition is that the pressure sensitive adhesive composition which fills such a demand that carries out glimpse conflict was not considered by conventional technology. [ in order to fulfill the demand characteristics (3) of conventional technology, it is required for an anti-microorganism agent to contact at least with a capture microorganism, but ] In the binder presentation from the former, there were many systems which hardly contain moisture substantially, contact with a microorganism and an anti-microorganism agent was not performed efficiently, and a microorganism did not become extinct actually, but when excessive, the microorganism propagated, the transfer of the bacillus was made to carry out on the outskirts of a footwear bottom-on the contrary, and becoming the cause of resoiling was also guessed. If an example is taken in such a situation, a binder presentation which increases the contact opportunity of a validity of an anti-microorganism agent and an anti-microorganism agent which annihilate a capture microorganism for a short time will be demanded.

[0004]

[Means for solving problem] The above-mentioned object consists of a base material and a binder layer which was formed from a hydrophilic polymeric material and the hydrophilic low-molecular matter and which contains moisture moderately, and is attained by the anti-microorganism nature pressure sensitive adhesive sheet which contains the water-soluble anti-microorganism nature matter in this binder layer further. That is, this invention relates to the anti-microorganism nature pressure sensitive adhesive sheet which the gel layer which contains the hydrophilic low-molecular matter, water, and the anti-microorganism nature matter in a hydrophilic polymeric material forms on a base material, and is characterized by the adhesive strength of said gel layer being 50-500g / 20mm.

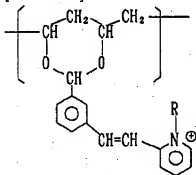
[0005] As what is preferably used as a base material, paper, a nonwoven fabric, etc. of non-water permeability which covered or laminated the water-repellent matter are mentioned, for example. As water-repellent matter, olefin system resin, such as polyethylene and polypropylene, ethylene-vinyl alcohol system resin, etc. are mentioned.

There are polyethylene lamination paper, a polypropylene lamination nonwoven fabric, etc., and, specifically, as for the construction material of a nonwoven fabric, rayon, polyester, cotton, etc. are used. Moreover, the paper which carried out sizing processing, and the paper which carried out the silicone coat are sufficient.

[0006] As for the anti-microorganism nature pressure sensitive adhesive sheet of this invention, the adhesive gel layer which consists of an aqueous composition containing a hydrophilic polymeric material, the hydrophilic low-molecular matter, water, and the anti-microorganism nature matter is formed on the water-repellent base material. (It added.) Although the mixture of a hydrophilic polymeric material, the hydrophilic low-molecular matter, water, and the anti-microorganism nature matter was called "hydrous gel liquid" in \*\*\*\*\* , such mixture was water solutions, since it was made to dry after applying to a base material and was made hydrous gel, it considered and the way of the "aqueous composition" changed it so that intelligibly. Is it all right?

[0007] As a hydrophilic polymeric material, for example One or more sorts of nature, such as agar, carrageenin, a polyvinyl pyrrolidone, polyvinyl alcohol, gelatin, and a carboxymethyl cellulose, or a synthetic water soluble polymer, hydrophilic polyether system urethane polymer, the following structure expression : [0008]

[Formula 1]



[0009] The polyvinyl alcohol derivative and polyacrylic acid system which have the structural unit expressed by being alike, a polyacrylic acid (partial salt is also included) salt system high molecular compound, etc. are mentioned. As for these, what carries out mixed stirring of the cross linking agent water and if needed, or reacts with water, and forms a hydrous gel layer is desirable.

[0010] The amount of the hydrophilic polymeric material used of 3 to 60 % of the weight of abbreviation is 10 to 30 % of the weight still more preferably five to 40% of the weight preferably among an aqueous composition.

[0011] As a salt of polyacrylic acid, sodium salt, potassium salt, ammonium salt, etc. are mentioned. The thing of 1,000-100,000 is [ average degree of polymerization ] especially desirable still more desirable, and the salt of polyacrylic acid and/or polyacrylic acid is used, without limiting the thing of 20,000-70,000.

[0012] A polyvinyl alcohol derivative the still pilus JIUMU radical which has a formyl group in polyvinyl alcohol by an acetalization reaction Moreover, 0.5-3mol %, desirable -- 1-2mol

% -- it is water solubility, and since what was combined, i.e., the polyvinyl alcohol which has a still BAZORIUMU radical, moreover has optical functionality, it is desirable. For example, a gelling reaction is caused by irradiating light with a wavelength of 400nm or less. The average degree of polymerization of polyvinyl alcohol is 1,000 to 2,000 intensity preferably 500 or more.

[0013] As other hydrophilic polymeric materials, the carboxymethyl cellulose of the average degree of polymerization 300-500 (it is made to gel with various metal ions, such as calcium ion), The polyvinyl pyrrolidone of the average molecular weight 10,000-50,000 (it is made to gel by radiation-induced crosslinking etc.), Polyvinyl alcohol (it is made to gel by the boric acid, a borax, etc.) of the average degree of polymerization 1,000-2,000 and an agar, carrageenin, gelatin (it gels by cooling after the dissolution and heating in water), etc. are desirable.

[0014] When using polyacrylic acid and/or its salt, the compound which has at least two epoxy groups is used as a cross linking agent of this component into a molecule. By using a cross linking agent, the gel layer crosslinking density excelled [ gel layer ] in cohesiveness highly is obtained, and the part does not carry out transfer of such a gel layer to the adherend side. As this cross linking agent, polyethylene glycol diglycidyl ether, ethylene glycol diglycidyl ether, glycerol diglycidyl ether, glycerol triglycidyl ether, triglycidyl isocyanurate, etc. mention, and it is \*\*\*\*, for example.

[0015] Among an aqueous composition, about 0.01 to 10% of the weight, the amount of the cross linking agent used is 0.1 to 1 % of the weight, and if it separates from this range, since the cohesiveness of hydrous gel, water-repelling-proof nature, etc. will fall, it is not preferably desirable.

[0016] the hydrophilic low-molecular matter used for this invention is what achieves the function which carries out the maintenance reservation of the moisture of a hydrous gel layer -- molecular weight 30-5,000 -- it is high boiling point liquefied matter, deliquescent mineral, etc. of 50-1,000 preferably. As high boiling point liquefied matter, the boiling point is the liquefied matter which is 100-400 degrees C, for example, polyhydric alcohol, sugar-alcohol, etc. are illustrated. As polyhydric alcohol, ethylene glycol, a diethylene glycol, The polyhydric alcohol of the carbon number 2-6 of triethylene glycol, a polyethylene glycol, propylene glycol, a polypropylene glycol, a glycerol, etc. can use it preferably, and D-mannitol, an inositol, a sorbitol, etc. can be used as sugar-alcohol. Moreover, deliquescent mineral can also be used. When deliquescent mineral is used, desirable conductivity is especially given to a gel layer by moderate moisture and these salts. A lithium nitrate, a lithium chloride, etc. are mentioned as an example of deliquescent mineral.

[0017] The amount of the hydrophilic low-molecular matter used is 20 to 70 % of the weight preferably about five to 90% of the weight among an aqueous composition. A moisture absorption effect or a moisturizing effect remarkable at 5 or less % of the weight are not obtained, and at 90 % of the weight or more, the viscosity of an aqueous composition is too high, and since these moisturizers have bad workability, they are not desirable.

[0018] The water content of an aqueous composition is 20 to 70 % of the weight still more preferably ten to 80% of the weight preferably five to 95% of the weight. Moreover, the moisture regain of the hydrous gel layer after bridge formation is kept desirable in 10 to 80% of the weight of the range five to 92% of the weight.

[0019] As anti-microorganism nature matter used for this invention, a proper quantity of water-soluble disinfectants or antimicrobial agents etc. are used. As a disinfectant, alcohols, glutaraldehyde, an iodine hole, the povidone iodine, a benzalkonium chloride, benzethonium chloride, alkylpolyamino ethylglycine, gluconic-acid cyclo HEKISHIJIN, etc. are mentioned. Moreover, as an antimicrobial agent, pyridine oxide system compounds, such as an organic nitrogen sulfur halogenated compound [, such as organic nitrogen sulfur system compound /, such as bends iso thiazoline, / and 5-chloro 2-methyl 4-iso thiazoline-3-ON, ], 2, and 2'-dithio-screw (pyridine 1-oxide), etc. are mentioned.

[0020] Although the amount of the anti-microorganism nature matter used is suitably decided by the state of a covering side etc., it is 0.1 to 10 % of the weight still more preferably 0.01 to 50% of the weight among an aqueous composition preferably.

[0021] The anti-microorganism nature pressure sensitive adhesive sheet of this invention applies the aqueous composition containing a hydrophilic polymeric material, the hydrophilic low-molecular matter, an antimicrobial agent, and water to the base material of non-water permeability, and is manufactured by making it dry at 10-200 degrees C. The gel layer by which the anti-microorganism nature matter dissolves the constituent for gel formation made to form filmy in the surface by moderate adhesiveness and moisture regain being given by the case after treatment and by making it harden at the temperature of 10-80 degrees C is formed.

[0022] For example, on a plate radical, turn the reverse side of \*\*\*\*\* of a 10-300-micrometer-thick water-repellent base material up, and it is placed. Flow casting spreading of the aqueous composition containing a hydrophilic polymeric material, the hydrophilic low-molecular matter, an antimicrobial agent, and water is carried out using a precision coat tool (applicator), a 5-150-micrometer-thick coated layer is formed, and it is manufactured by making this absorb moisture after desiccation or desiccation below to fixed moisture regain. Moreover, the continuous manufacturing method rolled round after applying by a fountain coating machine etc. and drying with a drying furnace using a delivery roller is industrially advantageous.

[0023] [ thus, the gel layer of the anti-microorganism nature pressure sensitive adhesive sheet of formed this invention ] 3 to 60 % of the weight -- desirable -- 5 to 40% of the weight of a hydrophilic polymeric material, and 5 to 90 % of the weight -- desirable -- 20 to 70% of the weight of the hydrophilic low-molecular matter, and 0.01 to 50 % of the weight -- desirable -- 0.1 to 10% of the weight of the anti-microorganism nature matter -- and it consists of 10 to 80% of the weight of water preferably five to 92% of the weight.

[0024] the adhesive strength (it applies to JISK6854 correspondingly) which lengthened the gel layer in the direction of 180 degree the rate for 30cm/in a SUSBA430BA plate, and was

removed -- 50-500 -- they are 100-400g / 20mm preferably g/20mm.

[0025] The anti-microorganism nature pressure sensitive adhesive sheet of this invention is explained using Drawings. Drawing 1 is the expanded sectional view of one embodiment of the anti-microorganism nature pressure sensitive adhesive sheet of this invention, and the hydrous gel layer in which 4 contains the layer of the water-repellent matter of a water-repellent base material, 2 contains supporters, and 3 contains an anti-microorganism agent is shown.

[0026] As the gestalt and the usage of the anti-microorganism nature pressure sensitive adhesive sheet of this invention, it installs on the desk which carries out sticking-by-pressure cleaning as a roller, which suppresses growth of fixed period bacteria as a covering sheet to a wall surface etc. and which installs in a floor line and carries out dust removing as a sticky mat, and is considered as dust collection sheets, such as falling bacteria, and maintaining cleanliness etc. is mentioned. It can use also as a lamination layer sheet by a case.

[0027] For example, since the contact frequency of the anti-microorganism agent 5 dissolved in water and the microorganisms 6 which were captured by the adhesive layer 3 increases by minding the moisture in gel as shown in drawing 2 when the pressure sensitive adhesive sheet of this invention is used as a dust-removing mat, a mat can be sterilized promptly and so much. On the other hand, the anti-microorganism agent dissolved in the water in an adhesive layer can expect to imprint with shift of moisture 7 also to the footwear bottom side which is adherend 8, and for it to also be sterilized, and to imprint from a footwear bottom also to a floor and to also sterilize a surrounding floor further. Moreover, when using it as a roller, while carrying out dust removing, an antimicrobial agent can imprint to a covering side, it can be used as a multifunctional cleaning tool of annihilating residual bacteria without capture \*\*\*\*\*, or suppressing the growth in respect of processing of a roller, and an environment can be disinfected efficiently. Furthermore, when it is used as a covering sheet, of course, after an activity can expect sterilization according to the residual effectiveness of an antimicrobial agent during an activity. When it places on a desk, the bactericidal effect by the imprint of the antimicrobial agent to the vessel placed with sterilization of falling bacteria can also be expected.

[0028] Next, the example of this invention is shown and this invention is explained still more concretely.

100.5g of polyacrylic acid (Nippon Junyaku make 10H of the average degree of polymerization 40,000) of example 1 marketing is dissolved in 84g of water. It dissolves heating 86g of polyacrylic acid (Nippon Junyaku make of the average degree of polymerization 40,000 10LP), and Glycerol 217g furthermore. Subsequently, addition mixing of NaOH 35g was carried out, and the sodium polyacrylate / glycerol mixing hydrous gel solution of whenever [ 60% of saponification ] were obtained. Triglycidyl isocyanurate is dissolved in water and it adds so that concentration may become 0.5% of the weight

eventually into this mixed liquor, and it may become 2 and 2'-dithio-screw - (pyridine 1-oxide) and 0.31% of the weight, and the gel solution whose concentration of sodium polyacrylate is 20. % of the weight is obtained. This gel solution was applied by the applicator so that thickness might be set to 20 micrometers on a 70-micrometer-thick polyethylene laminated paper, 3hr desiccation was carried out at 70 degrees C, and the gel sheet of this invention was obtained. When the water content of the obtained gel sheet was measured, it was 20.8 % of the weight. The adhesive strength which lengthened the rate for 30cm/in a SUSBA430BA plate, and was removed was 210g / 20mm.

[0029] example 2 still BAZORIUMU-ized polyvinyl alcohol (whenever [ the average degree of polymerization 1700 and / saponification ] -- 99.5mol % --) In Sbq introduction rate% of 0.5mol of the water-solution 70 weight section, 12.5% of the weight The 6.5-% of the weight water-solution 30 weight section of carboxymethylcellulose sodium (average molecular weight 100,000-110,000), A commercial disinfectant benzalkonium chloride is dissolved in water, and it adds so that concentration may become 1.0% of the weight eventually to the hydrous gel which added the sorbitol 40 weight section, and the gel solution whose concentration of a water soluble polymer is 7.6 % of the weight is obtained. This gel solution is applied by a fountain coating machine so that thickness may be set to 30 micrometers on a 80-micrometer-thick polypropylene lamination nonwoven fabric. a UV lamp with an output [ after drying with a drying furnace for 2 minutes and rolling round continuously at 100 degrees C ] of 2kW -- single-sided 1000 mJ/cm2 every -- both sides -- it irradiated, the gamma ray (quantity-of-radiation 2.5KGy) which makes the cobalt 60 a line source further was irradiated, and the gel sheet of this invention was obtained. When the water content of the obtained gel sheet was measured, it was 60.4 % of the weight. The adhesive strength which lengthened the rate for 30cm/in a SUSBA430BA plate, and was removed was 140g / 20mm.

[0030] The gel sheet obtained in the example 3 example 1 is pushed against each base material shown in the following table with a roller. It asked for the imprinted sample with the acetonitrile / water =50/50 solution, asked for the concentration of 2 and 2'-dithio-screw - (pyridine 1-oxide) with liquid chromatography after extraction, and the amount of antimicrobial agents imprinted to the base material side was measured.

[0031]

[Table 1]

基材	抗菌剤転写量
不織布	0.75mg/m <sup>2</sup>
硬質塩ビ板	0.1mg/m <sup>2</sup>
ゴム板	0.05mg/m <sup>2</sup>



[0032] From the above-mentioned table, the data that the antimicrobial agent of the gel layer was imprinted in each base material were checked.

The gel sheet obtained in the example 4 example 1 was pushed with the roller on the rayon nonwoven fabric, and the inhibition ring of the following bacteria was measured for the imprinted sample with the plate disc method.

[0033]

[Table 2]

細菌の種類	阻止円 (mm)
S. Aureus	1
B. Subtilis	1. 2 5

[0034] From the above-mentioned table, the data that the antimicrobial agent of the gel layer was imprinted to the nonwoven fabric side were checked.

[0035] It is Staphylococcus aureus  $1.5 \times 10^5$  to the gel sheet obtained in the example 5 example 2. An individual / cm<sup>3</sup> It is the diluted bacteria solution to an adhesive face 10microl/cm<sup>2</sup> It is dropped at spacing. The colony which took the replica with the food stamp (NISSUI PHARMACEUTICAL CO., LTD.) after fixed time, and grew after culture at 32 degrees C was counted. The sample which has not added the disinfectant as a blank took the replica similarly.

[0036]

[Table 3]

	0 時間	1. 5 時間	8 時間	24時間	96時間
消毒剤入りサンプル	7 8 0	4	0	0	0
ブランク	8 6 0	4 3 0	2 1 0	3 0	0

表中の値はコロニー数 / 1 0 0 c m <sup>2</sup>

[0037] From the above-mentioned table, the bacteria of the adhesive face of the sample containing a disinfectant changed suddenly temporally, and 8 hours afterward became zero piece, and becoming extinct was checked. On the other hand, if blank, it decreased temporally, but it turned out that 210 pieces survive also in 8 hours.

It is Bacillus subtilis  $1.5 \times 10^6$  to the gel sheet obtained in the example 6 example 1. An individual / cm<sup>3</sup> The replica was taken like the example 5 except having replaced with the diluted bacteria solution.

[0038]

[Table 4]

	0時間	1.5時間	5時間	24時間	96時間
抗菌剤入りサンプル	6240	20	0	0	0
ブランク	5220	4660	3080	4540	3300

表中の値はコロニー数/100cm<sup>2</sup>

[0039] From the above-mentioned table, the bacteria of the adhesive face of the sample containing an antimicrobial agent changed suddenly temporally, and 5 hours afterward became zero piece, and becoming extinct was checked. On the other hand, if blank, it decreased temporally, but it turned out that 3300 pieces survive also in 96 hours.

[0040]

[Effect of the Invention] The anti-microorganism nature pressure sensitive adhesive sheet of this invention consists of a base material with a non-water penetration side, and a hydrous gel layer containing an antimicrobial agent. Adhesiveness is given by bridge formation, and while having the outstanding dust-removing effectiveness, since an antimicrobial agent and moderate moisture are included, this gel layer annihilates the bacteria adhering to a gel layer efficiently and promptly. By furthermore minding water, an antimicrobial agent can be made to be able to imprint to adherend and growth of the bacteria in a covering side can also be controlled. On the other hand, when this gel layer performs crosslinking treatment by a cross linking agent etc. preferably, since crosslinking density is highly excellent in cohesiveness, it has the advantage as for which size becomes practically that a part of binder layer does not carry out transfer to the adherend side. Moreover, since the gel sheet by this invention contains moderate moisture, especially, desirable conductivity is given and there is the static electricity occurrence prevention effectiveness by the exfoliation at the time of using as a lamination layer sheet.

---

[Translation done.]